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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/606,252	06/28/2000	Raminda U. Madurawe	A293D	5633

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EXAMINER

BROCK II, PAUL E

ART UNIT PAPER NUMBER

2815

DATE MAILED: 12/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/606,252

Applicant(s)

MADURAWA ET AL.

Examiner

Paul E Brock II

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 27,29-31,33-38,40,42-44 and 48-52 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 27,29-31,33-38,40,42-44 and 48-52 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 February 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

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DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the “further doping the first pocket implant and the second pocket implant with a blanket implant” and “the first and second pocket implants are further doped with a blanket implant” must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled “Replacement Sheet” in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 27, 29 – 31, 33, 34, 35 – 38, 40, 42 – 44, and 48 – 52 are rejected under 35

U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

It is not clear where in the originally filed specification support for “further doping the first pocket implant and the second pocket implant with a blanket implant” or “wherein the first and second pocket implants are further doped with a blanket implant” [emphasis added] can be found. The originally filed written description on page 11, lines 11 – 19 describe an additional implant “In the specific embodiment, an additional blanket boron implant (with a preferred dose in the range of 10^{11} cm⁻²) is used to increase the channel doping of the native transistor. This provides a greater margin of punch-through immunity. The impact of this blanket boron doping on the p-channel transistors can be mitigated by slightly increasing the doping concentration of the n-well in step 820. Such a technique will allow additional margin for transistor punch-through immunity.” This section of the originally filled specification does not provide support for further doping of the pocket implants. Instead it appears that this section of the originally filed specification describes an additional implantation step to the channel regions before the

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pocket implantations are made. The originally filed claims include claims 6 and 7 which claim “6. The transistor of claim 5, wherein the pocket implants are further doped with a blanket boron implant,” and “7. The transistor of claim 6, wherein a dosage of the blanket boron implant is about 10^{11} cm^{-2} .” It should be noted that these claims are device claims which only claim the structure of the additional implant to the channel described in the original specification. These claims do not provide support for the current method claim limitations. The figures fail to show or mention this further implantation step. Therefore, no support for this further implantation step is found in the originally filed disclosure in any of the specification, claims or figures.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 27, 29, 30, 31, 33, 34, 49, and 50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okumura et al. (USPAT 5763921, Okumura) in view Yuki et al. (USPAT 5466957, Yuki) and Sanchez (USPAT 5583067).

With regard to claim 27, Okumura discloses in figures 2 – 7 a method of fabricating a transistor in an integrated circuit device. Okumura discloses in figure 2 providing a semiconductor substrate (1). Okumura discloses in figure 6 implanting a field implant (63). Okumura discloses in figure 5 implanting a well implant (62). Okumura discloses in figure 4 implanting an enhancement implant (61). Okumura discloses in figure 7 forming a gate oxide

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(7) on the semiconductor substrate. Okumura discloses in figure 7 forming a gate (8) on the gate oxide. Okumura discloses in figures 4 – 7 a source region (10b) and a drain region (10a).

Okumura does not teach pocket implants. Yuki teaches in figure 3b implanting (22) a first pocket implant (right side 21a) into the semiconductor substrate from a first side of the gate. Yuki teaches in figure 3b implanting a second pocket implant (left side 21a) into the semiconductor substrate from a second side of the gate. Yuki further teaches in figure 3b – 3d wherein first pocket implant and the second pocket implant are in contact at about the center of a channel region. It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the pocket implants of Yuki in the method of Okumura in order to suppress short channel effect while reducing the electric field concentration as stated by Yuki in column 1, lines 47 – 51 and column 4, lines 31 – 41. The pocket implants of Yuki result in an excellent semiconductor device, as Yuki states in column 4, lines 31 – 41. Okumura discloses in figures 13 and 18 further doping (regions 53b and 63, respectively) the channel regions with a blanket implant (B⁺). It is further obvious in the method of Okumura and Yuki wherein the further doping would further dope the first pocket implant and the second pocket implant with the blanket implant. Yuki teaches in column 5, lines 54 – 60 that the pocket implants are boron implants. Okumura and Yuki are silent to the first pocket implant and the second pocket implant laterally diffusing in the semiconductor substrate. Sanchez teaches in column 7, lines 40 – 45 lateral diffusion of boron. It would have been obvious to one of ordinary skill in the art at the time of the present invention for the pocket implants of Okumura and Yuki to diffuse laterally such as the implants of Sanchez because later process steps will facilitate the diffusion as stated by Sanchez in column 7, lines 40 – 45.

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With regard to claim 29, Yuki teaches in figure 3b the first pocket implant and the second pocket implant are implanted at an angle.

With regard to claim 30, Yuki teaches in figure 3b the first pocket implant and the second pocket implant are implanted using the gate as a mask.

With regard to claim 31, it should be noted that “wherein the diffusing increases a reverse short channel effect of the transistor” is an intended use limitation that does not bear any patentable weight within the method claim. Therefore, Okumura, Yuki, and Sanchez read on the claimed invention.

With regard to claim 33, Yuki teaches in figure 3a – 3d; column 5, lines 51 – 67; and column 6, lines 1 – 11 forming a source on the first side of the gate and a drain on the second side of the gate, wherein the source and drain are doped at a first polarity and the first pocket implant and the second pocket implant are doped at a second polarity.

With regard to claim 34, Yuki teaches in figure 3b – 3d; column 5, lines 51 – 67; and column 6, lines 1 – 11 that the first polarity is different than the second polarity.

With regard to claim 49, Okumura discloses in figures 13 and 18 wherein the blanket implant comprises boron (B⁺).

With regard to claim 50, Okumura discloses in figures 13 and 18, column 15, lines 22 – 34 and column 16, lines 30 – 41 wherein a dosage of the blanket implant is about 10^{11} cm^{-2} . It should be noted that Okumura’s dosage of $1 \times 10^{12} \text{ cm}^{-2}$ reads on the claimed dosage of about 10^{11} cm^{-2} . (see MPEP 2144.05 II).

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6. Claims 35 – 38, 40, 42 – 44, 48, 51, and 52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yuki in view of Sanchez and Okumura.

With regard to claim 35, Yuki discloses in figures 3a – 3d a method of fabricating a transistor in an integrated circuit device. Yuki discloses in figure 3a providing a semiconductor substrate (21). Yuki discloses in figure 3b forming a gate oxide (23) on the semiconductor substrate. Yuki discloses in figure 3b forming a gate (24) on the gate oxide. Yuki discloses in figure 3b implanting a first pocket implant (right side of 21a) and a second pocket implant (left side of 21a) into the semiconductor substrate using the gate as a mask. Yuki discloses in column 5, lines 53 – 60 that the pocket implants are boron implants. Yuki is silent to the first pocket implant and the second pocket implant laterally diffusing in the semiconductor substrate. Sanchez teaches in column 7, lines 40 – 45 lateral diffusion of boron. It would have been obvious to one of ordinary skill in the art at the time of the present invention for the pocket implants of Yuki to diffuse laterally such as the implants of Sanchez because later process steps will facilitate the diffusion as stated by Sanchez in column 7, lines 40 – 45. It is therefore obvious that Yuki has diffusing of the first pocket implant and the second pocket implant laterally as shown in figures 4a and 4b the first pocket implant obviously merges with the second pocket implant due to the implant conditions of the original implants and the later processing. Yuki and Sanchez are silent to a further implant wherein the pocket implants are further doped with a blanket implant. Okumura discloses in figures 13 and 18 wherein the channel regions are further doped (regions 53b and 63, respectively) with a blanket implant (B+). It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the blanket implant of Okumura in the method of Yuki and Sanchez in order to optimize the

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threshold voltage of the transistor as stated by Okumura in column 12, lines 48 – 51 and column 13, lines 1 – 4. It is further obvious in the method of Okumura and Yuki wherein the first pocket implant and the second pocket implant are further doped with the blanket implant.

With regard to claims 36, it should be noted that “wherein the diffusing increases a threshold voltage of the transistor” is an intended use limitation that does not bear any patentable weight within the method claim. Therefore, Yuki and Sanchez read on the claimed invention.

With regard to claim 37, Yuki and Sanchez teach forming transistors with pocket implants. Yuki and Sanchez do not disclose implanting an enhancement implant. Okumura teaches in figure 12 implanting an enhancement implant (53a) in the semiconductor substrate. It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the enhancement implant of Okumura in the method of Yuki and Sanchez in order to prevent punch through of the device as stated by Okumura in column 12, lines 46 – 48.

With regard to claim 38, Yuki discloses in figures 3a – 3d a method of fabricating a transistor in an integrated circuit device. Yuki discloses in figure 3a providing a semiconductor substrate (21) having a surface. Yuki discloses in figure 3b forming a gate oxide (23) on the semiconductor substrate surface. Yuki discloses in figure 3b forming a gate (24) on the gate oxide. Yuki discloses in figure 3b implanting a first pocket implant (right side of 21a) and a second pocket implant (left side of 21a) into the semiconductor substrate from the first side of the gate at an angle. Yuki discloses in column 5, lines 53 – 60 that the pocket implants are boron implants. Yuki is silent to the first pocket implant and the second pocket implant laterally diffusing in the semiconductor substrate. Sanchez teaches in column 7, lines 40 – 45 lateral diffusion of boron. It would have been obvious to one of ordinary skill in the art at the time of

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the present invention for the pocket implants of Yuki to diffuse laterally such as the implants of Sanchez because later process steps will facilitate the diffusion as stated by Sanchez in column 7, lines 40 – 45. It is therefore obvious that Yuki has diffusing of the first pocket implant and the second pocket implant laterally as shown in figures 4a and 4b the first pocket implant obviously merges with the second pocket implant due to the implant conditions of the original implants and the later processing. Yuki and Sanchez are silent to a further implant wherein the pocket implants are further doped with a blanket implant. Okumura discloses in figures 13 and 18 wherein the channel regions are further doped (regions 53b and 63, respectively) with a blanket implant (B+). It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the blanket implant of Okumura in the method of Yuki and Sanchez in order to optimize the threshold voltage of the transistor as stated by Okumura in column 12, lines 48 – 51 and column 13, lines 1 – 4. It is further obvious in the method of Okumura and Yuki wherein the first pocket implant and the second pocket implant are further doped with the blanket implant.

With regard to claim 40, Yuki discloses in figure 3b wherein the first pocket implant and the second pocket implant are implanted using the gate as a mask.

With regard to claim 42, Yuki discloses in figures 3a – 3d a method of fabricating a transistor in an integrated circuit device. Yuki discloses in figure 3a providing a semiconductor substrate (21). Yuki discloses in figure 3b forming a gate oxide (23) on the semiconductor substrate. Yuki discloses in figure 3b forming a gate (24) on the gate oxide. Yuki discloses in figure 3b implanting a first pocket implant (right side of 21a) and a second pocket implant (left side of 21a) into the semiconductor substrate from the first side of the gate at an angle. Yuki

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discloses in column 5, lines 53 – 60 that the pocket implants are boron implants. Yuki is silent to the first pocket implant and the second pocket implant laterally diffusing in the semiconductor substrate. Sanchez teaches in column 7, lines 40 – 45 lateral diffusion of boron. It would have been obvious to one of ordinary skill in the art at the time of the present invention for the pocket implants of Yuki to diffuse laterally such as the implants of Sanchez because later process steps will facilitate the diffusion as stated by Sanchez in column 7, lines 40 – 45. It is therefore obvious that Yuki has diffusing of the first pocket implant and the second pocket implant laterally as shown in figures 4a and 4b the first pocket implant obviously merges with the second pocket implant due to the implant conditions of the original implants and the later processing. Yuki and Sanchez are silent to a further implant wherein the pocket implants are further doped with a blanket implant. Okumura discloses in figures 13 and 18 wherein the channel regions are further doped (regions 53b and 63, respectively) with a blanket implant (B+). It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the blanket implant of Okumura in the method of Yuki and Sanchez in order to optimize the threshold voltage of the transistor as stated by Okumura in column 12, lines 48 – 51 and column 13, lines 1 – 4. It is further obvious in the method of Okumura and Yuki wherein the first pocket implant and the second pocket implant are further doped with the blanket implant.

With regard to claims 43, it should be noted that “wherein the diffusing increases a threshold voltage of the transistor” is an intended use limitation that does not bear any patentable weight within the method claim. Therefore, Yuki and Sanchez read on the claimed invention.

With regard to claim 44, Yuki and Sanchez teach forming transistors with pocket implants. Yuki and Sanchez do not disclose implanting an enhancement implant. Okumura

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teaches in figure 12 implanting an enhancement implant (53a) in the semiconductor substrate. It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the enhancement implant of Okumura in the method of Yuki and Sanchez in order to prevent punch through of the device as stated by Okumura in column 12, lines 46 – 48.

With regard to claims 48, 51 and 52, Okumura discloses in figures 13 and 18 wherein the blanket implant comprises boron (B+).

Response to Arguments

7. Applicant's arguments filed October 21, 2004 have been fully considered but they are not persuasive.

With regard to applicant's argument that the cited references do not teach the further doping step. It should be noted that Okumura discloses in figures 13 and 18 the further doping step and the combination would include all of the claim limitations. Therefore, applicant's arguments are not persuasive, and the rejection is proper.

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after

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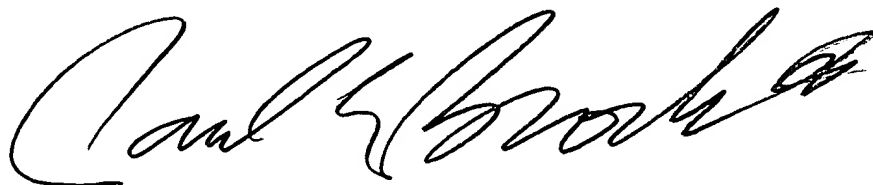
the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Paul E Brock II whose telephone number is (571) 272-1723. The examiner can normally be reached on 8:30 AM - 5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (571) 272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Paul E Brock II

A handwritten signature in black ink, appearing to read "Paul E Brock II", with a stylized flourish at the end.